

(12) United States Patent

Rovner et al.

(54) MAGNETIC FLOWMETER FLOWTUBE ASSEMBLY WITH INTERCHANGEABLE LINER/ELECTRODE MODULE

(71) Applicant: **Rosemount Inc.**, Chanhassen, MN (US)

Inventors: Bruce D. Rovner, Minneapolis, MN

(US); Steven B. Rogers, Minnetonka,

MN (US)

Assignee: MICRO MOTION, INC., Boulder, CO

(US)

(*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 24 days.

Appl. No.: 14/319,332 (21)

(22)Filed: Jun. 30, 2014

Prior Publication Data (65)

US 2015/0377666 A1 Dec. 31, 2015

(51) **Int. Cl.**

G01F 1/32 (2006.01)

G01F 1/58 (2006.01)

(52)U.S. Cl.

CPC G01F 1/584 (2013.01); G01F 1/586

(2013.01)

(58) Field of Classification Search

CPC G01F 1/58; G01F 1/32 See application file for complete search history.

(56)**References Cited**

U.S. PATENT DOCUMENTS

4,065,965	Α		1/1978	Ackerman et al.
5,458,005	Α	*	10/1995	Perelshteyn G01F 1/3263
				73/861.18
5,533,549	Α	*	7/1996	Sherman F16K 27/067
				137/556.6
5,750,902	Α		5/1998	Schwiderski

US 9,410,830 B2 (10) Patent No.: Aug. 9, 2016

(45) Date of Patent:

7,926,361	B2 *	4/2011	Hoecker	G01F 1/3209
				73/861.22
2013/0006544	A1	1/2013	Rovner	
2013/0061971	A1	3/2013	Chamberland	

2013/0305838 A1 11/2013 Mikolichek et al. 2014/0090483 A1 4/2014 Smith et al.

FOREIGN PATENT DOCUMENTS

JP 02-268231 A 11/1990

OTHER PUBLICATIONS

International Search Report and Written Opinion for International Application No. PCT/US2015/037991, date of mailIng: Sep. 24, 2015, date of filing: Jun. 26, 2015, 11 pages.

* cited by examiner

Primary Examiner — Jewel V Thompson (74) Attorney, Agent, or Firm — Christopher R. Christenson; Kelly, Holt & Christenson, PLLC

(57)**ABSTRACT**

A flowtube assembly for a magnetic flowmeter is provided. The flowtube assembly includes a tube extending from a first mounting flange to a second mounting flange. Each of the first and second mounting flanges has a pipe flange facing surface for mounting to a respective pipe flange. A coil chamber is disposed outside the tube, between the first and second mounting flanges. The coil chamber has at least one coil located inside that is configured to generate a magnetic field within the tube. A liner/electrode module is positioned within the tube and has a non-conductive liner, at least one electrode and at least one electrode conductor. The non-conductive liner extends from the first mounting flange to the second mounting flange. The at least one electrode is positioned in the non-conductive liner to interact with a conductive process fluid. The electrode conductor extends from the at least one electrode to an interconnect tab disposed adjacent the pipe facing flange surface of one of the first and second mounting flanges. The liner/electrode module is positionable within the tube.

22 Claims, 8 Drawing Sheets

